**PET AND CT ASSESSMENT OF CORONARY FLOW PHYSIOLOGY**

**D.S. Berman1**, M. Motlagh1, D. Dey1, J.D. Friedman1, S.W. Hayes1, L.E.J. Thomson1,

L. Shaw2, B.K. Tamarappoo3, G. Germano1, P. Slomka1

1. Cedars-Sinai, Los Angeles, California USA

2. Emory University, Atlanta, Georgia, USA

3. Cleveland Clinic, Cleveland, OH, USA

Assessment of fractional flow reserve (FFR) and coronary flow reserve (CFR) by invasive coronary angiography (ICA) provide physiologic assessments that complement the anatomic assessment of coronary stenosis for guiding patient management of patients with coronary artery disease (CAD). FFR provides assessment of epicardial lesion flow limitation, while CFR assesses flow across the coronary vascular tree, including the microvasculature. Discordance of 40% between these measures has been documented. Normal CFR can be seen in lesions with abnormal FFR, documenting sufficient capacity to increase flow due to increased metabolic demand, and normal FFR can be seen in lesions with abnormal CFR in the presence of microvascular dysfunction.  Coronary CT angiography (CCTA) and positron emission tomography (PET) myocardial perfusion imaging (MPI) can provide multiple assessments of coronary physiology beyond coronary stenosis and perfusion defect. PET MPI, the gold standard of CFR measurement, is now routinely assessed in clinical practice. Abnormal PET CFR has shown an adverse prognosis in patients with CAD, even in the absence of demonstrable coronary plaque. As PET CFR declines, mortality increases in patients with known or suspected CAD, across the spectrum of regional perfusion defect findings. CCTA can assess coronary plaque burden and adverse plaque characteristics. Automated, reproducible quantitative assessments of these CCTA features correlate strongly with intravascular ultrasound measurements and provide incremental information over coronary stenosis alone in prediction of ischemia and in prognostic evaluation. FFR by CT (FFRct) can be assessed from a routinely acquired CCTA without requiring pharmacologic vasodilation. FFRct has been shown to correlate well with and to be a better predictor of invasive FFR than coronary stenosis. Thus, multiple assessments beyond stenosis and myocardial perfusion defects can be assessed with CCTA and PET MPI. These measurements, individually or in selected patients in combination, may be useful in guiding management of the CAD patient.